

Questions/Statements for Discussion

- Validity of Regge factorisation and uncertainty on Pomeron parameterizations?
 - Revisit additional freedom introduced in the description of data and resulting systematic uncertainty of the constraints on theory from measurements of diffraction.
- Sufficient freedom of analytical shapes of PDF currently implemented in PDF fits?
 - Error bands from DGLAP evolution are still small for larger Q^2 even in regions, where there are no direct constraints from data. Is there anything that forbids completely arbitrary functions? Will these still lead to similarly small uncertainties at larger Q^2 ?

Questions/Statements for Discussion

- Beware of naive LO estimates of kinematics!
(More serious problem at LHC, but should be studied at RHIC also.)
 - Likely, low p_T (mass) particle production has significant contribution from large Q^2 and large x even for forward rapidity.
 - Models to predict particle production need correct description of gluon density at large (x, Q^2) , even if from LO estimates one expects small x to dominate for the observable in question.
 \Rightarrow Only use models with the correct asymptotic behaviour at large (x, Q^2)

Questions/Statements for Discussion

- Need “comprehensive” theory/model for predictions of signals of saturation.
 - Be able to compare different observables (light hadrons, charm, J/ψ , photons, ..., correlations) consistently from one framework.
 - Study onset of saturation - needs to match asymptotic limit of pQCD.
 - Use state-of-the-art theoretical tools.
 - Ideally available in Monte-Carlo version to study experimental performance.

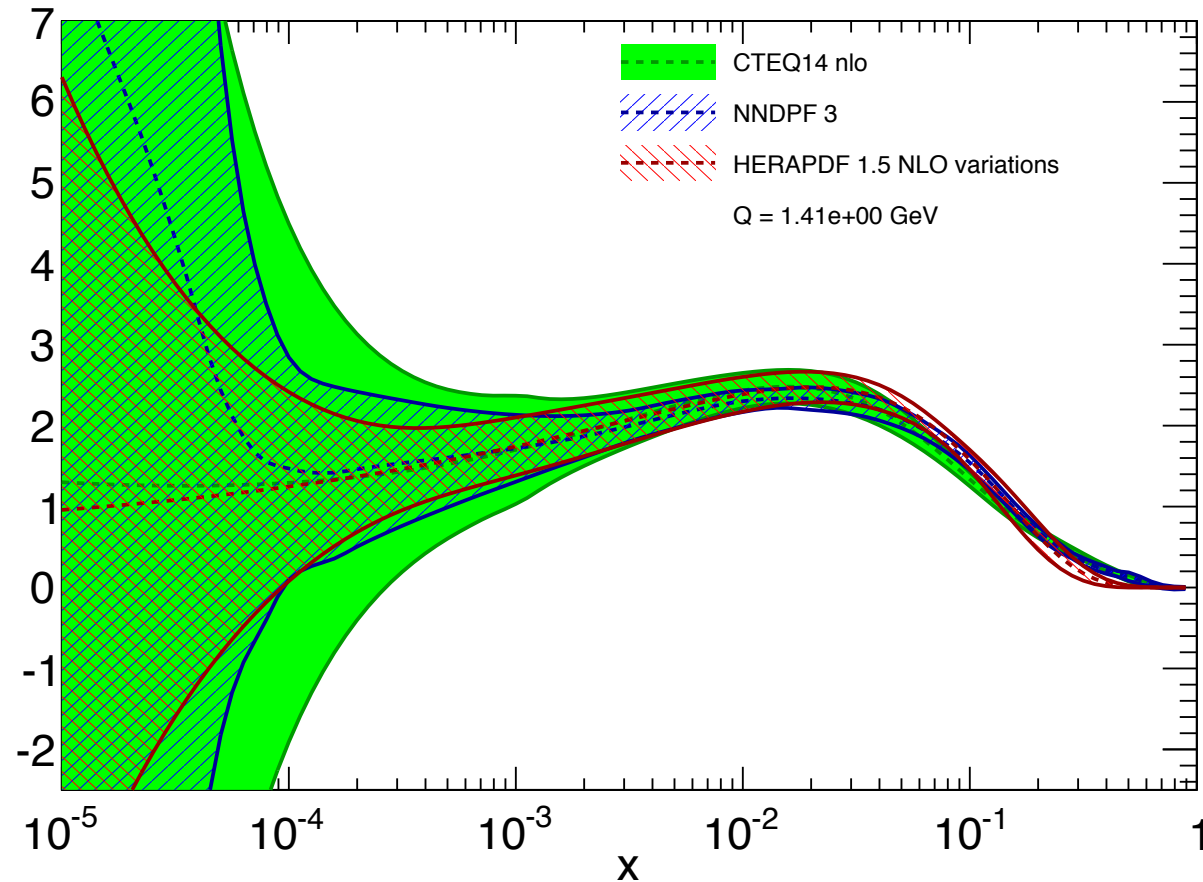
Questions/Statements for Discussion

- In view of final state modifications in pA at LHC - can one at all use hadronic observables in pA to constrain the initial state?
- Can one make use of synergy between detector R&D for LHC (i.e. FoCal) and EIC?

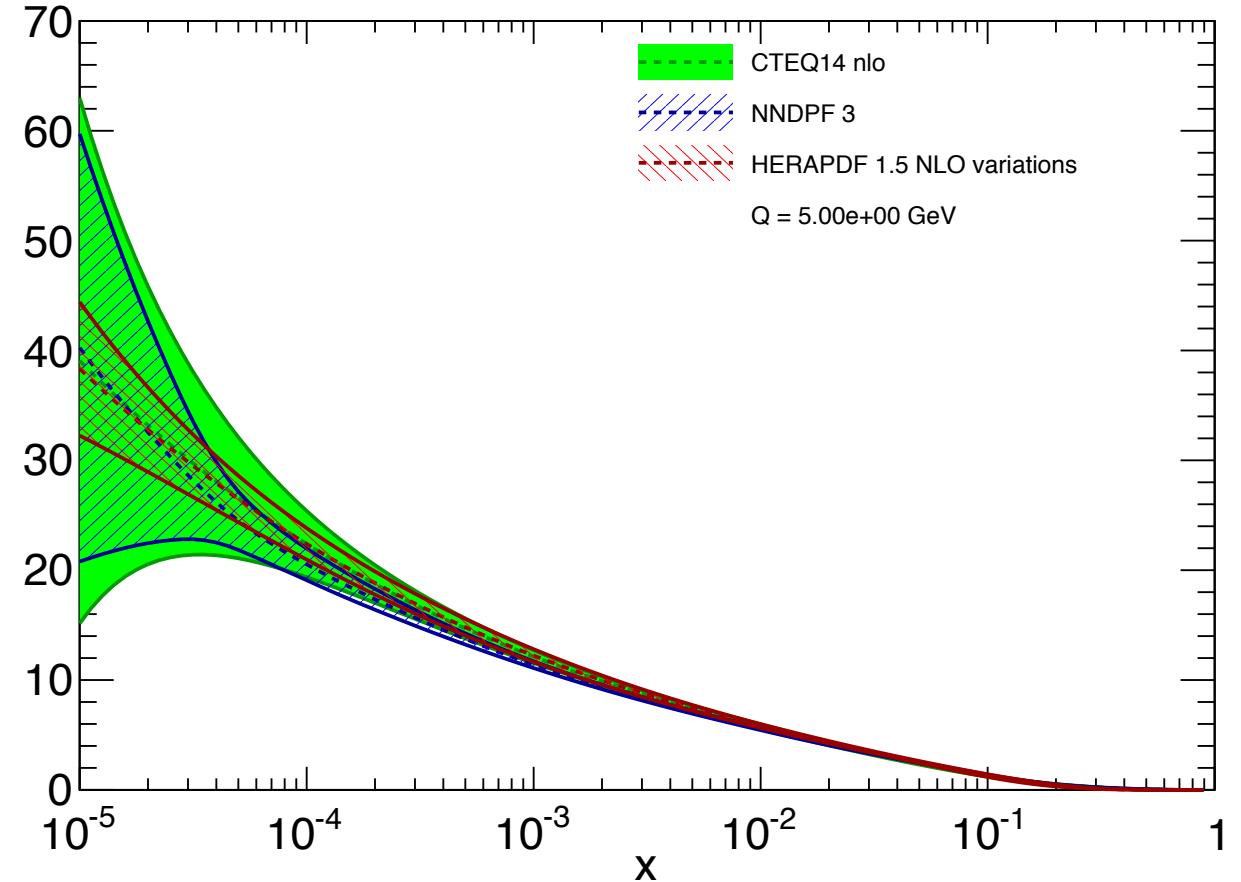
Backup Material

Gluon Densities at Low x (Protons)

$xg(x,Q)$, comparison



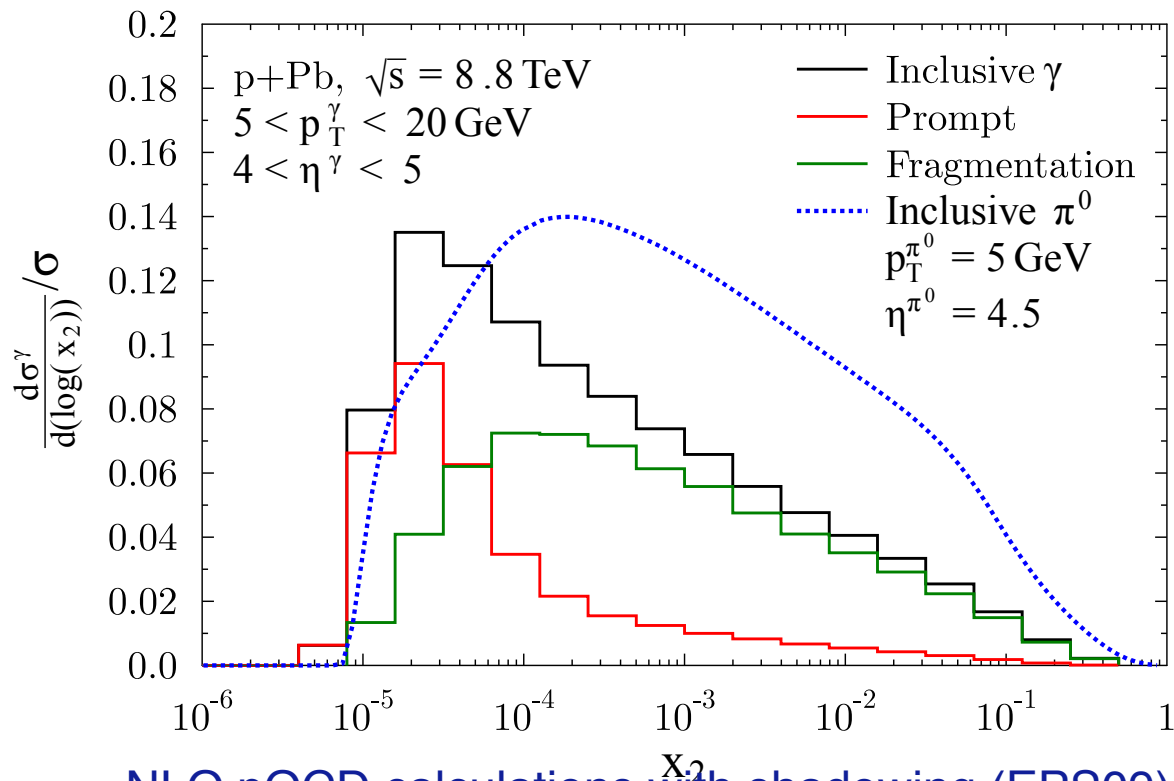
$xg(x,Q)$, comparison



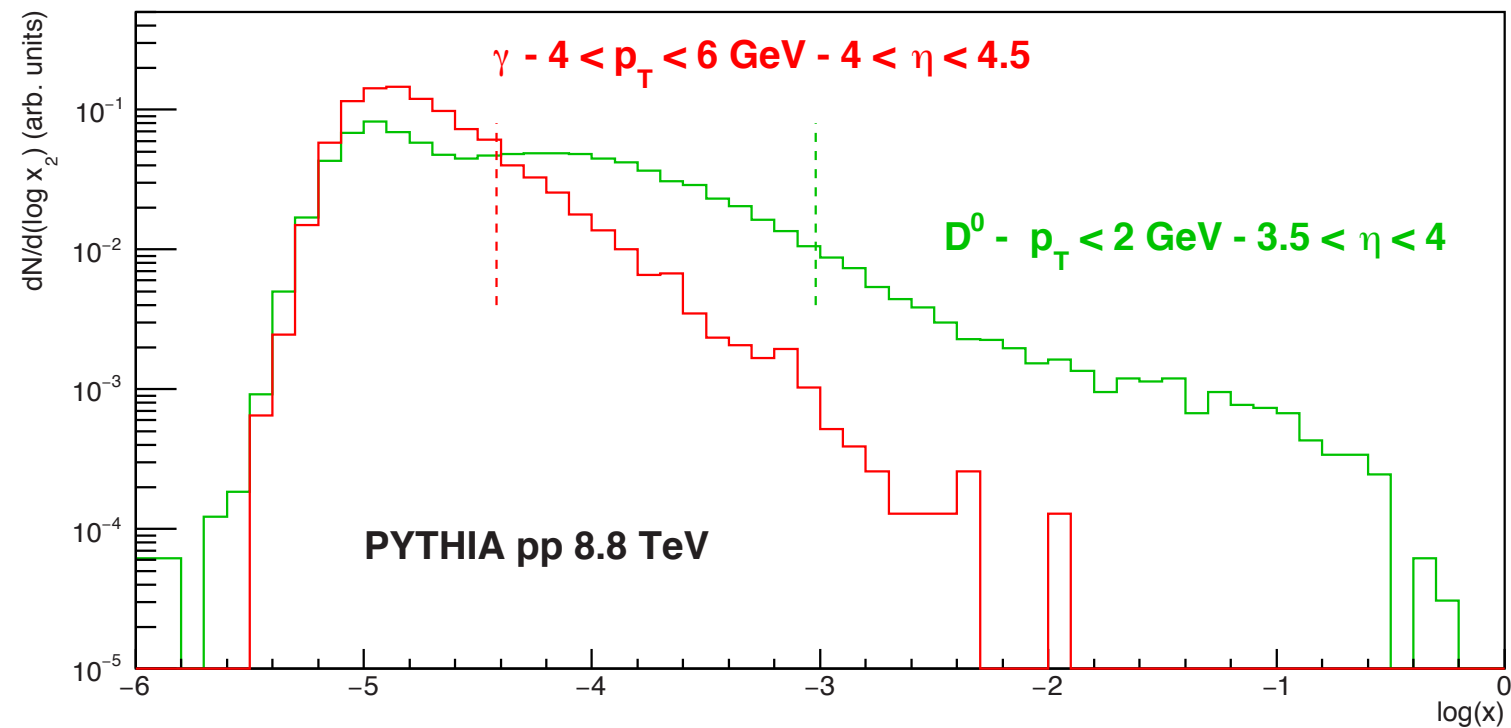
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- at $Q = 1.41 \text{ GeV}$, $g(x)$ essentially unconstrained for $x < 10^{-4}$
- apparent uncertainty significantly reduced at slightly larger Q (5 GeV)
 - not from more data constraints!
 - strong role of QCD evolution
- careful: we want to test QCD evolution!

x-Sensitivity



NLO pQCD calculations with shadowing (EPS09)
 Helenius, Eskola, Paukkunen, arXiv:1406.1689



- x_2 distributions for forward production at LHC
- significant tails towards large x

Final State Nuclear Modification of HF in p–Pb?

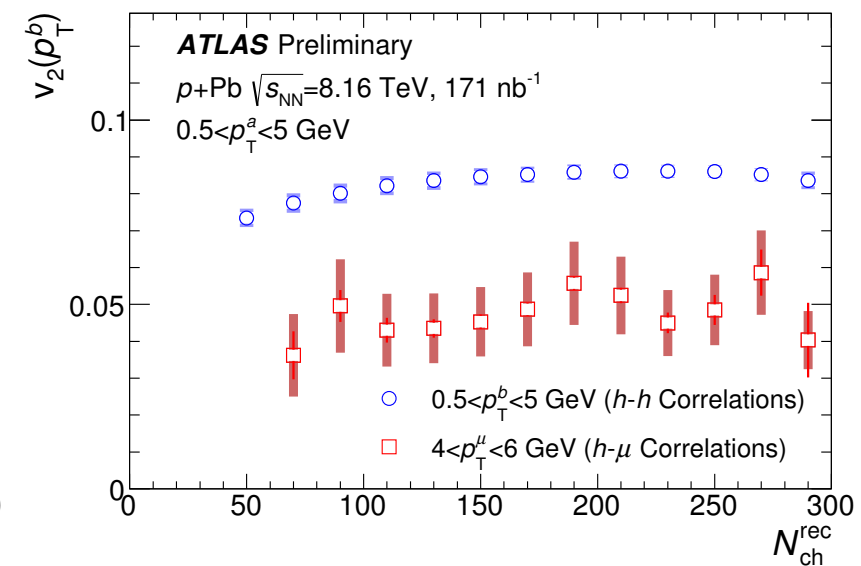
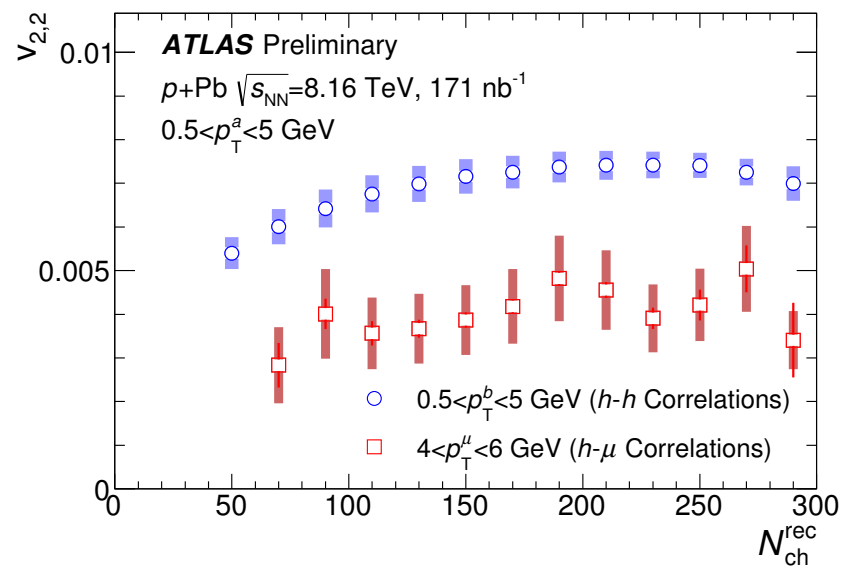
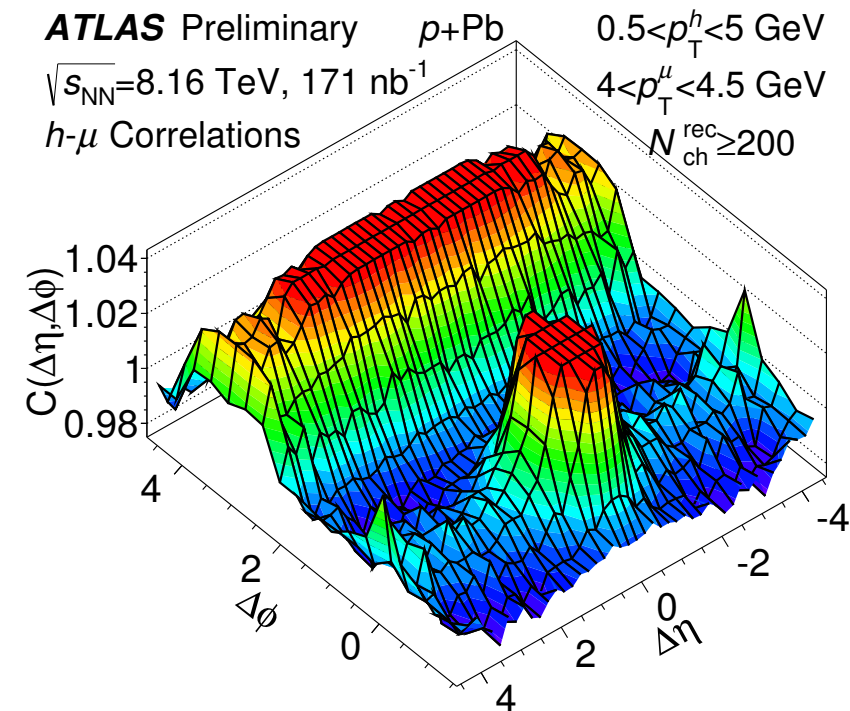
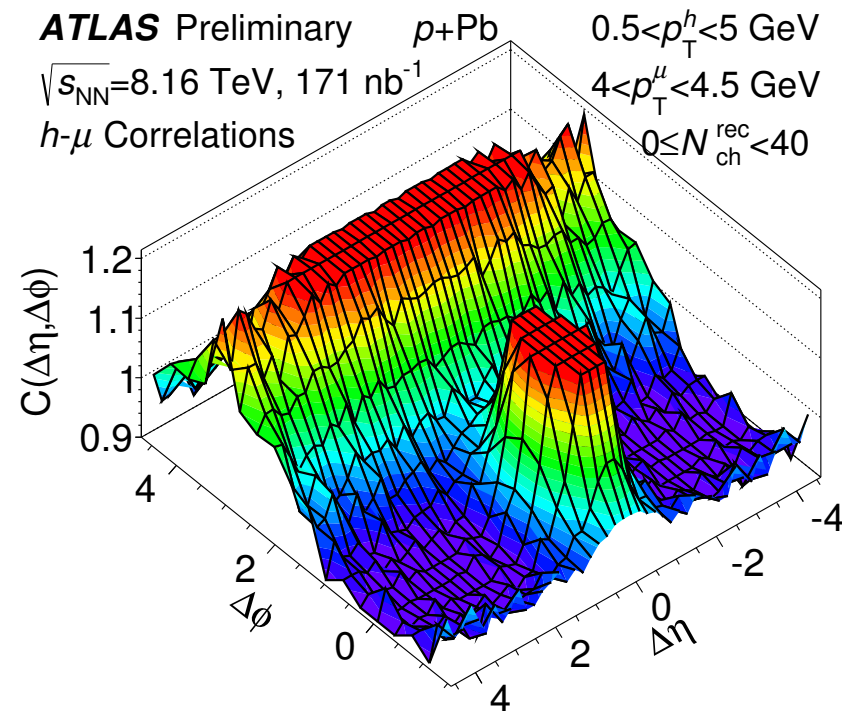
recent results from ATLAS
(presented at QM2017):
ATLAS-CONF-2017-006

study of h - μ angular
correlations,
observe flow-like correlation
of muons

in high multiplicity p–Pb
(muons dominated by
heavy flavour)

heavy flavour suffering final
state modification in pPb?

still useful as initial state
probe?

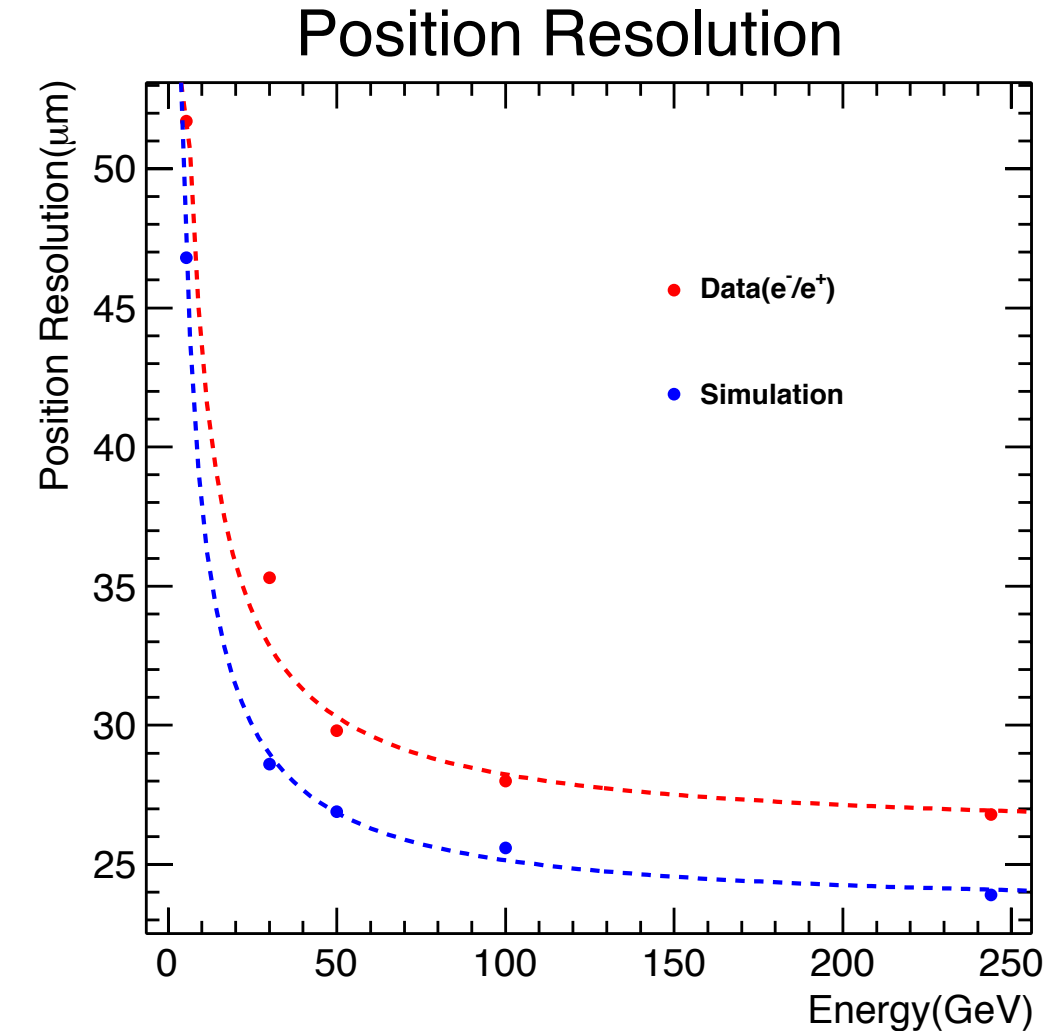


R&D - Position Resolution and Shower Separation

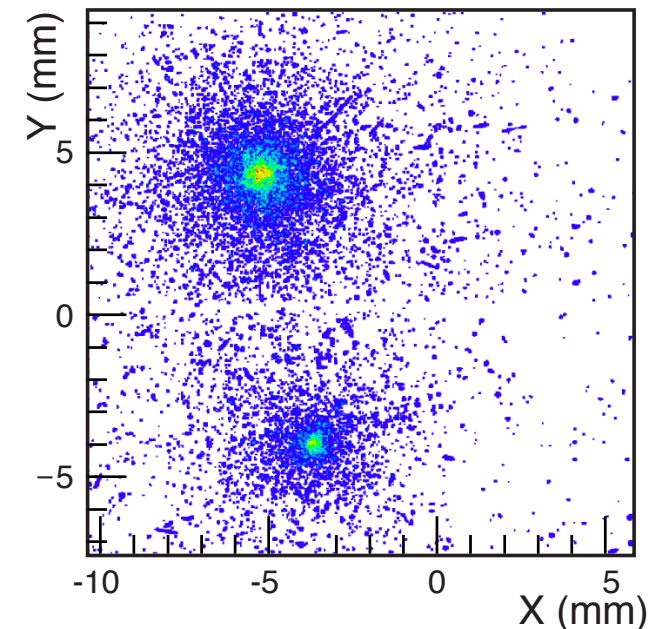
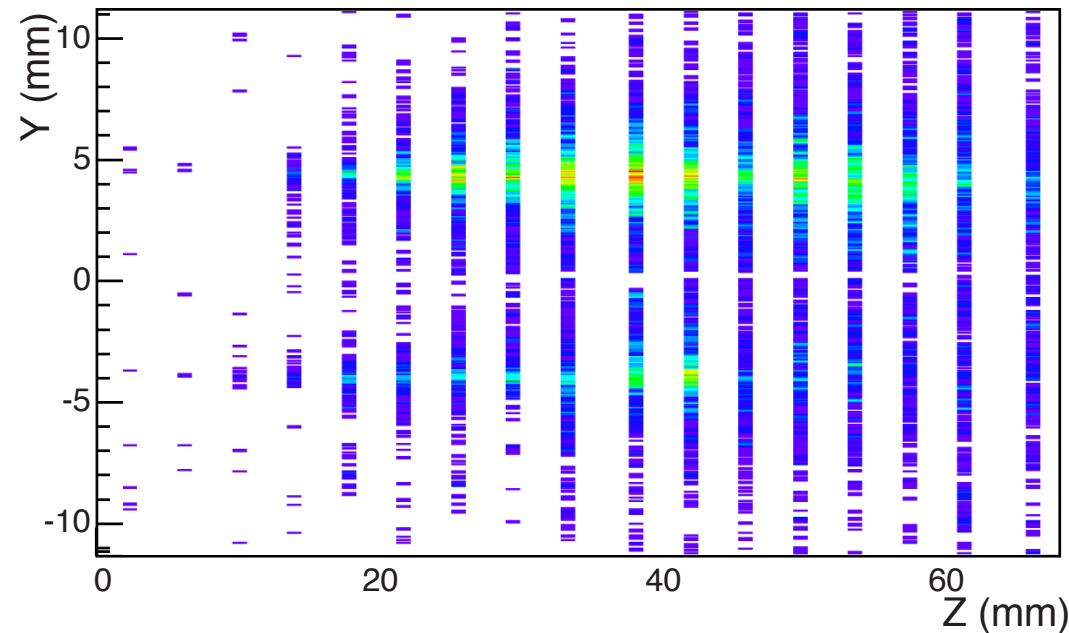
calculate difference of position from

- cluster in layer 0 and
- center of gravity of shower in layers 1 - 23

single shower position resolution obtained from width of residuals



single-event from data: two neighbouring showers



can provide excellent two-shower separation